

Listing of Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (Previously presented) Apparatus for producing a tire reinforcement from a thread delivered substantially continuously and on request by an appropriate dispenser, the apparatus being intended to be used in cooperation with a substantially toroidal form on which the reinforcement is progressively constructed by laying hoops of the thread between spaced ends of a desired path for the thread on the surface of the form, the apparatus comprising:

a guiding member in which the thread can slide freely;

an oscillating-arm system having

(a) at least a first arm oscillating about a first geometrical axis of rotation and oriented substantially perpendicular thereto, the oscillating first arm comprising a head remote from the first geometrical axis of rotation, the head of the oscillating arm transporting said guiding member directly, or indirectly via one or more other arms, to guide the thread along the desired path by causing said guiding member to pass over, but without substantially contacting, the form, with movement of at least a portion of said guiding member being substantially contained in a movement plane that is substantially perpendicular to said first geometrical axis of rotation; and

(b) means for varying a radial distance, in said movement plane, between said guiding member and said first geometrical axis of rotation during said movement of said guiding member;

control means for imparting to the oscillating first arm an oscillatory movement about the first geometrical axis of rotation; and

pressure means adjacent each of the ends of the path for applying the thread to the form at the respective ends of the path.

2. (Previously presented) Apparatus according to claim 1, wherein said oscillating arm system comprises:

a second arm oscillating about a second geometrical axis of rotation, the first and second geometrical axes of rotation being substantially parallel;

the second arm comprising a head transporting the guiding member directly, or indirectly via one or more other arms; and

the head of the first arm supporting the second arm for rotation about the second geometrical axis of rotation.

3. (Original) Apparatus according to claim 2, in which the head of the second arm is radially remote from the second geometrical axis of rotation.

4. (Original) Apparatus according to claim 2, further comprising means for controlling the relative position of the second arm with respect to the first arm so that the guiding member is transported in a cyclical movement in order to bring the guiding member in successive cycles into the vicinity of each of the desired ends for the thread in the path.

5. (Original) Apparatus according to claim 2, in which the head of the second arm is curved towards the substantially toroidal form on which the reinforcement is to be constructed, and directly supports the guiding member, so as to bring the guiding member close to the form at least in the configuration assumed by the apparatus when the guiding member is close to the end of the desired path.

6. (Previously presented) Apparatus according to claim 2, in which the second arm has at least one intermediate part oriented substantially parallel to the first geometrical axis of rotation.

7. (Original) Apparatus according to claim 2, in which the second arm includes a base which includes the second geometrical axis of rotation and which is oriented substantially perpendicular to the second geometrical axis of rotation.

8. (Original) Apparatus according to claim 7, in which the first arm supports a succession of pinions including a first fixed pinion centered on the first geometrical axis of rotation, an end pinion centered on the second geometrical axis of rotation and rotationally fixed relative to the second arm, and an intermediate pinion meshing with the first pinion and the end pinion.

9. (Original) Apparatus according to claim 8, in which the number of teeth N_f of the fixed pinion is less than the number of teeth N_e of the end pinion, where $N_f = a N_e$, the first arm describing oscillations of extent α , α being negative in the trigonometric sense, and the second arm describing oscillations of extent $\beta = 180^\circ - a\alpha$ about the said form, β being positive in the trigonometric sense.

10. (Original) Apparatus according to claim 8, in which the number of teeth N_f of the fixed pinion is greater than the number of teeth N_e of the end pinion, where $N_f = a N_e$, the first arm describing oscillations of extent α in the space on the side of the first geometrical axis of rotation opposite the form, and the second arm describing oscillations of extent $\beta = a\alpha$ about the form, α being negative in the trigonometric sense, β being positive in the trigonometric sense.

11. (Original) Apparatus according to claim 7, in which the first arm supports a notched belt mounted on a first pulley, centered on the first geometrical axis of rotation and rotationally fixed relative thereto, and on a second pulley, centered on the second geometrical axis of rotation and rotationally fixed relative to the second arm.

12. (Original) Apparatus according to claim 2, further comprising a fixed cam centered on the first geometrical axis of rotation, a cam follower supported on the first arm in engagement with the cam, the first arm comprising a shoe, the movement of which is controlled by the cam follower, the second arm comprising a lever substantially perpendicular to the second geometrical axis of rotation, the end of said lever being connected to the shoe by a link.

13. (Original) Apparatus according to claim 2, in which the head of the second oscillating arm directly transports the guiding member.

14. (Previously presented) Apparatus according to claim 2, in which the at least one arm comprises a central portion intersecting the first geometrical axis of rotation in substantially perpendicular relation thereto, the central portion joining an end portion of the arm substantially parallel to the second geometrical axis of rotation and supporting the guiding member, said central portion being translatable radially with respect to the first geometrical axis of rotation.

15. (Original) Apparatus according to claim 14, comprising:

a fixed cam; and

a cam follower in engagement with the fixed cam and rotationally fixed relative to the central portion of the arm, the translational movement of the central portion being controlled by the cam follower.

16. (Previously presented) Apparatus according to claim 1, in which the first geometrical axis of rotation intersects the form on which the reinforcement is to be constructed in the working position, the at least first arm being formed and arranged so that the guiding member skirts around the form, the relative movement between guiding member and the form determining the desired path for the thread on the surface of the form.

17. (Previously presented) Apparatus according to claim 2, in which the guiding member comprises an orifice at the end of the second oscillating arm to dispense the thread onto the surface of the form, the second arm being hollow and having the thread passing therethrough.

18. (Original) Apparatus according to claim 1, in which the means for controlling the oscillating arm transports the guiding member in a cyclical movement described in one movement plane, so as to bring the guiding member in successive cycles into the vicinity of each of the desired ends for the thread in the thread path.

19. (Previously presented) A method for producing a tire, in which a reinforcement is produced from a thread delivered substantially continuously and on request by an appropriate dispenser, using a substantially toroidal form on which the reinforcement is progressively constructed by laying hoops of the thread between spaced ends of a desired path for the thread on the surface of the form, by means of

a guiding member in which the thread can slide freely;

an oscillating-arm system having

(a) at least a first arm oscillating about a first geometrical axis of rotation and oriented substantially perpendicular thereto, the oscillating first arm comprising a head remote from the first geometrical axis of rotation, the head of the oscillating arm transporting said guiding member directly, or indirectly via one or more other arms, to guide the thread along the desired path by causing said guiding member to pass over, but without substantially contacting, the form, with movement of at least a portion of said guiding member being substantially

contained in a movement plane that is substantially perpendicular to said first geometrical axis of rotation; and

(b) means for varying a radial distance, in said movement plane, between said guiding member and said first geometrical axis of rotation during said movement of said guiding member;

control means for imparting to the first arm an oscillatory movement about said first geometrical axis of rotation, the apparatus being arranged so that the head of the oscillating arm transports the guiding member directly, or indirectly via one or more other arms;

pressers close to the respective ends of the path for applying the thread to the form at the ends;

the guiding member having a cyclical movement included in said movement plane, in order to bring the guiding member in successive cycles into the vicinity of each of the spaced ends for the thread in the path; and

the pressers acting in synchronism with the cyclical movement of the guiding member to apply lengths of thread from one of the beads of the tire to the other bead.

20. (Original) A method for producing a tire according to claim 19, in which the reinforcement is produced by laying the hoops of the thread side by side on the surface of the form.

21. (Previously presented) Apparatus according to claim 1, wherein said guiding member comprises an orifice adapted to dispense the thread onto the surface of the form, wherein said at least a portion of said guiding member the movement of which is substantially contained in the movement plane includes said orifice.

22. (Previously presented) Apparatus according to claim 1, wherein substantially all of said guiding member is contained in said movement plane.

23. (Previously presented) Apparatus according to claim 19, wherein substantially all of said guiding member is contained in said movement plane.

24. (Previously presented) Apparatus for producing a tire reinforcement from a thread delivered substantially continuously and on request by an appropriate dispenser, the apparatus being intended to be used in cooperation with a substantially toroidal form on which the reinforcement is progressively constructed by laying hoops of the thread between spaced ends of a desired path for the thread on the surface of the form, the apparatus comprising:

a guiding member in which the thread can slide freely;

an oscillating-arm system having

(a) at least a first arm oscillating about a first geometrical axis of rotation and oriented substantially perpendicular thereto, the oscillating first arm comprising a head remote from the first geometrical axis of rotation, the head of the oscillating arm transporting said guiding member directly, or indirectly via one or more other arms, to guide the thread along the desired path; and

(b) means for varying a radial distance between said guiding member and said first geometrical axis of rotation during said movement of said guiding member;

control means for imparting to the oscillating first arm an oscillatory movement about the first geometrical axis of rotation; and

pressure means adjacent each of the ends of the path for applying the thread to the form at the respective ends of the path; and

the apparatus being arranged in the working position and with respect to said form on which the reinforcement is to be constructed so that the first geometrical axis of rotation intersects the form.

25. (Previously presented) Apparatus according to claim 24, wherein said oscillating arm system comprises:

a second arm oscillating about a second geometrical axis of rotation, the first and second geometrical axes of rotation being substantially parallel;

the second arm comprising a head transporting the guiding member directly, or indirectly via one or more other arms; and

the head of the first arm supporting the second arm for rotation about the second geometrical axis of rotation.

26. (Previously presented) Apparatus according to claim 25, in which the head of the second arm is radially remote from the second geometrical axis of rotation.

27. (Previously presented) Apparatus according to claim 25, further comprising means for controlling the relative position of the second arm with respect to the first arm so that the guiding member is transported in a cyclical movement in order to bring the guiding member in successive cycles into the vicinity of each of the desired ends for the thread in the path.

28. (Previously presented) Apparatus according to claim 25, in which the head of the second arm is curved towards the substantially toroidal form on which the reinforcement is to be constructed, and directly supports the guiding member, so as to bring the guiding member close to the form at least in the configuration assumed by the apparatus when the guiding member is close to the end of the desired path.

29. (Previously presented) Apparatus according to claim 25, in which the second arm has at least one intermediate part oriented substantially parallel to the first geometrical axis of rotation.

30. (Previously presented) Apparatus according to claim 25, in which the second arm includes a base which includes the second geometrical axis of rotation and which is oriented substantially perpendicular to the second geometrical axis of rotation.

31. (Previously presented) Apparatus according to claim 30, in which the first arm supports a succession of pinions including a first fixed pinion centered on the first geometrical axis of rotation, an end pinion centered on the second geometrical axis of rotation and rotationally fixed relative to the second arm, and an intermediate pinion meshing with the first pinion and the end pinion.

32. (Previously presented) Apparatus according to claim 31, in which the number of teeth N_f of the fixed pinion is less than the number of teeth N_e of the end pinion, where $N_f = a N_e$, the first arm describing oscillations of extent α , α being negative in the trigonometric sense, and the second arm describing oscillations of extent $\beta = 180^\circ - a\alpha$ about the said form, β being positive in the trigonometric sense.

33. (Previously presented) Apparatus according to claim 31, in which the number of teeth N_f of the fixed pinion is greater than the number of teeth N_e of the end pinion, where $N_f = a N_e$, the first arm describing oscillations of extent α in the space on the side of the first geometrical axis of rotation opposite the form, and the second arm describing oscillations of extent $\beta = a\alpha$ about the form, α being negative in the trigonometric sense, β being positive in the trigonometric sense.

34. (Previously presented) Apparatus according to claim 30, in which the first arm supports a notched belt mounted on a first pulley, centered on the first geometrical axis of rotation and rotationally fixed relative thereto, and on a second pulley, centered on the second geometrical axis of rotation and rotationally fixed relative to the second arm.

35. (Previously presented) Apparatus according to claim 25, further comprising a fixed cam centered on the first geometrical axis of rotation, a cam follower supported on the first arm in engagement with the cam, the first arm comprising a shoe, the movement of which is controlled by the cam follower, the second arm comprising a lever substantially perpendicular to the second geometrical axis of rotation, the end of said lever being connected to the shoe by a link.

36. (Previously presented) Apparatus according to claim 25, in which the head of the second oscillating arm directly transports the guiding member.

37. (Previously presented) Apparatus according to claim 25, in which the at least one arm comprises a central portion intersecting the first geometrical axis of rotation in substantially perpendicular relation thereto, the central portion joining an end portion of the arm substantially parallel to the second geometrical axis of rotation and supporting the guiding member, said central portion being translatable radially with respect to the first geometrical axis of rotation.

38. (Previously presented) Apparatus according to claim 37, comprising:

a fixed cam; and

a cam follower in engagement with the fixed cam and rotationally fixed relative to the central portion of the arm, the translational movement of the central portion being controlled by the cam follower.

39. (Previously presented) Apparatus according to claim 24, in which said guiding member is caused to pass over, but without substantially contacting, the form, with movement of at least a portion of said guiding member being substantially contained in a movement plane that is substantially perpendicular to said first geometrical axis of rotation and the at least first arm is formed and arranged so that the guiding member skirts around the form, the relative movement between guiding member and the form determining the desired path for the thread on the surface of the form.

40. (Previously presented) Apparatus according to claim 25, in which the guiding member comprises an orifice at the end of the second oscillating arm to dispense the thread onto the surface of the form, the second arm being hollow and having the thread passing therethrough.

41. (Previously presented) Apparatus according to claim 24, in which the means for controlling the oscillating arm transports the guiding member in a cyclical movement described in one movement plane, so as to bring the guiding member in successive cycles into the vicinity of each of the desired ends for the thread in the thread path.

42. (Previously presented) Apparatus according to claim 24, wherein said guiding member comprises an orifice adapted to dispense the thread onto the surface of the form, wherein said at least a portion of said guiding member the movement of which is substantially contained in the movement plane includes said orifice.

43. (Previously presented) Apparatus according to claim 24, wherein substantially all of said guiding member is contained in said movement plane.

44. (Previously presented) Apparatus according to claim 42, wherein substantially all of said guiding member is contained in said movement plane.

45. (New) Apparatus according to claim 1, wherein at least one of said first arm and said other arms include at least one intermediate part extending along the direction parallel to the first geometrical axis of rotation.